

Multi-Platform, Multi-Architecture Runtime Verification of Autonomous Space Systems

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Research Objectives

Responsive

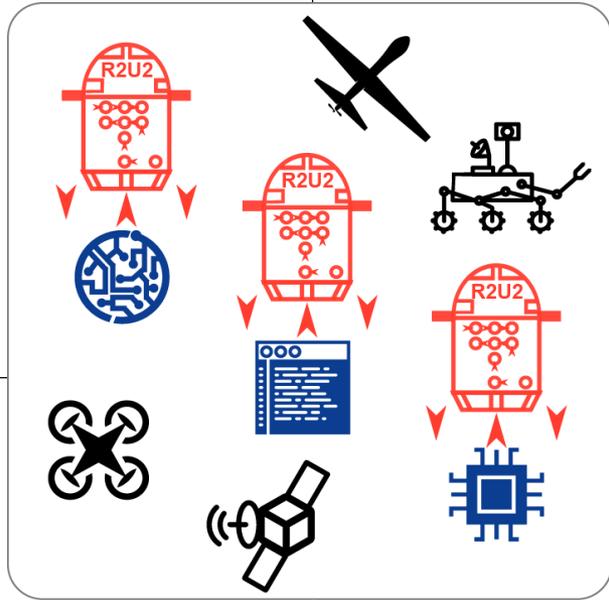
- Continuous monitoring, real-time safety reqs, mitigate off-nominal

Realizable

- FPGA, microcontroller, flight computer; software and sensor variables; timing guarantees

Unobtrusive

- No- or Low-overhead
- Respects functionality, certifiability, tolerances



Approach

- Temporal Logic** runtime observers
- Stand-alone for runtime verification
 - In combination with tiny Bayes Nets for System Health Management

Tiny Bayes Nets for **real-time** fault diagnosis

Hardware & Software Implementations for multi-platform reasoning

Potential Impact

- **New, open tool: R2U2**
- Adaptable, extensible, scalable framework
- Runtime Verification
- Real-time **System Health Management**
- Combination of hardware and software implementations for embedded optimization
- **System-level reasoning** combining sensor and software variables
- More **intelligent diagnostics** for autonomy